To: Safadi, Amer[Safadi.Amer@epa.gov]
Cc: Hooper, Charles A.[Hooper.CharlesA@epa.gov]; Vann, Bradley[Vann.Bradley@epa.gov]; Juett, Lynn[Juett.Lynn@epa.gov]
From: Mahler, Tom
Sent: Wed 2/24/2016 10:30:59 PM
Subject: RE: Latty Avenue Site - New data from Eberline Laboratory (UNCLASSIFIED)

I wanted to provide you the email we discussed in the hall earlier.

In regards first email of this chain from Marco Kaltofen and specifically the following statement: " Total Uranium activity in this sample is 854 pCi/g, with an enrichment level for 235-U of 4.1%, which is about average for civilian grade nuclear fuel materials."

While I cannot tell you exactly how this calculation was done, it appears that an average of the two U-235 results in the attached data file was calculated, i.e. ((3.83*10^1)+(3.08*10^1))/2 = 34.6 pCi/g of U-235 Then they divide that value by the total Uranium activity in the sample (which include U-238, U-235, and U-234), i.e. (34.6/854)*100 = 4.1%

First off, I'll just mention that one sample is not enough data to determine with any kind of certainty the abundance of U-235 associated with any contaminated materials.

That being said, there are numerous errors with this calculation.

1. Because U-235 has a half-life of 7.04*10^8 years and U-238 has a half-life of 4.47*10^9 years, you cannot simply divide the Uranium activity concentrations to determine enrichment. Enrichment percentage is calculated by comparing the number of atoms U-235 to the total number of atoms of both U-238 and U-235. It is therefore necessary to covert the activity to a number of atoms.

Using the following equation: Activity (A) = lambda * N,
where lambda is the decay constant and N is the number of atoms
One can convert the provided U-235 and U-238 activities in a 1 gram unit volume of sample material to a number of atoms.

2. U-234 is a decay product in the U-238 decay chain with a much shorter half-life than U-238. Naturally occurring Uranium should be in secular equilibrium with U-234 which means it should be present at roughly the same concentration as U-238. As a convention, it should not be included in the calculation to determine the abundance of U-235 in the sample. In other words, the reference in the Kaltofen email to the average enrichment of "civilian grade nuclear fuel materials" with U-235 would not include the amount U-234 in that calculation.

Just as a point reference, natural Uranium which includes U-238, U-235, and U-234 is found in the environment with relative activity ratios of 1.0/0.05/1.0 respectively. While the "enrichment level" calculated by the providers of the data is incorrect, natural uranium should have an activity ration associated with U-235 of approximately 5%.

I have to say that Chuck Hooper provided me some of this information in a previous email just to give him his credit.

Let me know if there are any questions,

Tom Mahler
On-Scene Coordinator
EPA Region 7

-----Original Message-----
From: Wade, Josephine A MVS [mailto:Josephine.A.Wade@usace.army.mil]

Sent: Wednesday, February 24, 2016 2:04 PM
To: Doster, Branden <branden.doster@dnr.mo.gov>; Evans, Erin <Evans.Erin@epa.gov>; Garoutte, Jonathan <Jonathan.Garoutte@health.mo.gov>; Safadi, Amer <Safadi.Amer@epa.gov>
Cc: Vann, Bradley <Vann.Bradley@epa.gov>; Schmidt, Aaron <aaron.schmidt@dnr.mo.gov>; Juett, Lynn <Juett.Lynn@epa.gov>; Mahler, Tom <mahler.tom@epa.gov>; Carey, Daniel <daniel.carey@dnr.mo.gov>
Subject: RE: Latty Avenue Site - New data from Eberline Laboratory (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Brandon
The USACE received this information.
Thanks
Jo Anne

Josephine (Jo Anne) Wade
Project Manager
U.S. Army Corps of Engineers
FUSRAP Office
8945 Latty Ave.
Berkeley, MO 63134
Office 314-260-3915 Cell 314-406-8263
josephine.a.wade@usace.army.mil

-----Original Message-----
From: Doster, Branden [mailto:branden.doster@dnr.mo.gov]
Sent: Wednesday, February 24, 2016 1:57 PM
To: 'evans.erin@epa.gov' <evans.erin@epa.gov>; Wade, Josephine A MVS <Josephine.A.Wade@usace.army.mil>; Garoutte, Jonathan <Jonathan.Garoutte@health.mo.gov>; safadi.amer@epamail.epa.gov
Cc: 'Vann.Bradley@epa.gov' <Vann.Bradley@epa.gov>; Schmidt, Aaron <aaron.schmidt@dnr.mo.gov>; 'Juett, Lynn (Juett.Lynn@epa.gov)' <Juett.Lynn@epa.gov>; Mahler, Tom <mahler.tom@epa.gov>; Carey, Daniel <daniel.carey@dnr.mo.gov>
Subject: [EXTERNAL] FW: Latty Avenue Site - New data from Eberline Laboratory

Wanted to make sure you all received this information below and attached. I believe this has already been sent to the USACE's FUSRAP office in St. Louis.

Thanks,

Branden

From: Marco Kaltofen [mailto:mpkaltofen@gmail.com]
Sent: Tuesday, February 23, 2016 9:32 AM
To: Bruce.a.munholand@usace.army.mil <mailto:Bruce.a.munholand@usace.army.mil> ; Taylor,

Shantell

Cc: josephine.a.wade@usace.army.mil <mailto:josephine.a.wade@usace.army.mil> ; lhixson; Robert Alvarez

Subject: Re: Latty Avenue Site - New data from Eberline Laboratory

Dear Ms. Taylor, Mr. Munholand, and Ms. Wade,

We have received additional data from our Latty Avenue sample. I have attached this data as an Excel file. Please let me know if you have any questions or concerns.

Very truly yours,

Marco Kaltofen, PhD, PE (Civil, MA), C. NSE

Boston Chemical Data Corp.

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Natick, MA 01760

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On Fri, Feb 19, 2016 at 2:25 PM, Marco Kaltofen <mpkaltofen@gmail.com <mailto:mpkaltofen@gmail.com> > wrote:

Dear Mr. Munholand,

In the course of pursuing a water quality study in northwestern St. Louis County, we encountered an unusually high activity bank sample in the Berkeley, MO reach of Coldwater Creek at Latty Avenue.

A couple of weeks ago we spoke with the MO AGO about this sample, and they kindly provided your contact information. We have accumulated further data on this sample. It is our belief that it would be more protective of the public health to provide your office with these data immediately, rather than wait months for scientific publication.

I have attached the interim data report from Eberline Laboratory of Oak Ridge, TN. Eberline is performing an analysis of this material on our behalf. (See attached Excel file number 06-01135) This work is part of our follow-up to our recent study published in the Journal Environmental Radioactivity (attached).

The sample was collected in the railroad spur area adjacent to Coldwater Creek at Latty Avenue. As you can see from the attachment prepared by the laboratory, 230-Th activity is 10,923 pCi/g. Total Uranium activity in this sample is 854 pCi/g, with an enrichment level for 235-U of 4.1%, which is about average for civilian grade nuclear fuel materials. The total sample activity is 320 KBq/kg (320,500 Bq/kg). These numbers appear elevated above pertinent environmental standards.

We also have a great deal of back up data for this sample. In particular, the microscopic analysis shows that the material contains respirable particles with 10 to 46 % by weight pure uranium. Three of the files labelled Latty, particle 4, show examples of this microscopic analysis.

Given the elevated activity of the sample in this location, we would happy to provide the COE with any further data should it be required.

Please let me know if you have any questions about these data.

Marco Kaltofen, PhD, PE (Civil, MA), C. NSE

Boston Chemical Data Corp.

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Natick, MA 01760

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twitter.com/MKaltofen <Blockedhttp://twitter.com/MKaltofen>

---------- Forwarded message ----------
From: Marco Kaltofen <mpkaltofen@gmail.com <mailto:mpkaltofen@gmail.com> >
Date: Thu, Feb 18, 2016 at 4:39 PM
Subject: Latty Avenue Site - New data from Eberline Laboratory

To: Shantell.Taylor@ago.mo.gov <mailto:Shantell.Taylor@ago.mo.gov>
Cc: lhixson <lhixson@enformable.com <mailto:lhixson@enformable.com> >, Robert Alvarez <kitbob@erols.com <mailto:kitbob@erols.com> >

Dear Ms. Taylor,

You may recall that a couple of weeks ago we spoke about a particularly high activity sample we collected in our study of radioactive materials related to the West lake Landfill in the St. Louis area. We have accumulated further data on this sample. It is our believe that it would be more protective of the public health to provide your office with these data immediately, rather than wait months for scientific

publication.

I have attached the interim data report from Eberline Laboratory of Oak Ridge, TN. Eberline is performing an analysis of this material on our behalf. (See attached Excel file number 06-01135) This work is part of our follow-up to our recent study published in the Journal Environmental Radioactivity (attached).

The sample was collected in the railroad spur area adjacent to Coldwater Creek at Latty Avenue in Hazelwood, MO. As you can see from the attachment prepared by the laboratory, 230-Th activity is 10,923 pCi/g. Total Uranium activity in this sample is 854 pCi/g, with an enrichment level for 235-U of 4.1%, which is about average for civilian grade nuclear fuel materials. The total sample activity is 320 KBq/kg (320,500 Bq/kg). These numbers are very significantly elevated above all pertinent environmental standards.

We also have a great deal of back up data for this sample. In particular, the microscopic analysis shows that the material contains respirable particles with 10 to 46 % by weight pure uranium. Three of the files labelled Latty, particle 4, show examples of this microscopic analysis.

Given the elevated activity of the sample in this location, we would like to get a copy of this data to the Corps of Engineers office in St. Louis. If you prefer that the COE get any notice directly from the MO AGO, that is more than acceptable to us. If not, if you have a preferred contact at the COE, we would be happy to send the information directly.

Please let me know if you have any questions about these data.

Very truly yours,

Marco Kaltofen, PhD, PE (Civil, MA), C. NSE

Boston Chemical Data Corp.

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twitter.com/MKaltofen <Blockedhttp://twitter.com/MKaltofen>

cc: L. Hixson, R. Alvarez

CLASSIFICATION: UNCLASSIFIED